

Applicant is submitting with this amendment the requested prior art DE 37 30 662 A1, as requested by the Examiner. Applicant is also submitting at this time additional references brought to Applicants attention in Germany.

The Examiner has objected to the specification as failing to support the term "second connector means" as set forth in the claims. The connector of the present invention has two distinct connector means. The first connector means are on one end of element 4 and consists of elements 5. Element 5 forms the connection between the connecting element 4 and the electrical wire. The second connector means is on the other end of element 4 and consists of the contact element 10 and its two resilient arms 13 and 14 which form an electrical connection with a flat portion of element 4. In order to avoid confusion and distinctly claim the invention, Applicant has referred to these separate connector means which appear on the drawings on opposite ends of element 4, as first and second connector means. It is Applicants position that the functions set forth in the claims for each of the first and second connector means clearly relates back to the appropriate elements described in the specification.

Applicant has amended the term "second connector means" to now read as "plug connector means". Support for this term can be found on page 5 lines 21 through 23 where the contact element 10 is described as being composed of a contact pin 11 and a plug connector element 12. The "plug connector means" describes a structure having the same function as the plug connector element

12. Applicant has also amended the claims to state that the plug connector means is part of the contact means. The contact means describing a structure having the same function as the contact element 10.

Applicant has also amended the remaining claims in order to overcome the Examiners objections and to incorporate the Examiners suggestions. Applicant thanks the Examiner for the careful reading of the claims and for suggesting possible changes.

In regards to claim 13 the Examiner is partially correct in that the contact means is partially outside the housing. Another portion of the contact means, notably prongs 13 and 14, are located inside the housing when the connector is fully assembled. When the connector is fully assembled, the contact means is movable inside the housing in order to prevent movement of the housing from being transferred to the contact means and possibly damaging the electrical connection between the contact means and the printed circuit board. It is therefore a very important feature for the contact means to be movably mounted in the housing. Applicant has amended claim 13 to state that the contact means is movably located in said housing. This further highlights this important feature of the invention.

The Examiner has rejected claims 1 through 13 as being anticipated by Pohl and has rejected claims 4, 5, 14 and 15 as being obvious over Pohl.

The present invention describes a connector specifically designed for making electrical connections between wires and

printed circuit boards. In particular, a connector which can be used repetitively. Applicant has discovered that a large cause in the failure of these types of repetitively used connectors is that the contact means, which is very often soldered to the circuit board, experiences high forces during the connection and disconnection. These high forces cause a failure or cracking of the soldered connection. The present invention describes a plug connector means on the contact means which blocks the transmission of force from reaching the contact means and possibly damaging the electrical connection between the contact means and the circuit board. In this way failures due to this force are eliminated. Pohl does not teach or suggest a connector for blocking such a force. Pohl does not even suggest that such a problem exists. It is only the Applicant who has recognized this problem and has invented a connector to avoid this problem. The connector of the present invention is therefore an improvement over Pohl and Pohl could not lead a person of average skill in the art to suggest the present invention which overcomes a problem not even addressed by Pohl. It is Applicants position that Pohl can not render the present invention obvious due to Pohl failing to address the problems addressed by the present invention.

Another important feature of the present invention is the housing as set forth in claim 12 and newly amended claims 5 and 15. The housing is set forth as being securely fastened to the circuit board and for absorbing the force applied to the connecting means. Pohl does not teach or suggest securely fastening a housing to a

circuit board as described in the present invention. Certainly any housing in Pohl does not absorb forces while other elements block forces. As described in the specification and in the drawings, Applicant has invented a connector which can be rigidly connected to the circuit board and yet still block connection and disconnection forces from damaging the electrical connection on the circuit board. In Pohl any forces applied to the housing or any part of the connector are transmitted to the electrical connection on the circuit board. As described above this can be very damaging for many connectors after repetitive numbers of connections and disconnections. The present invention avoids this by having the housing absorb the force. Any of this force that does reach the circuit board, does so through a non-electrical connection and therefore the force does not affect electrical connection between the wire and the circuit board. Since Pohl does not teach or suggest connecting the housing to the circuit board and using the housing to absorb the force applied during connection and disconnection, it is Applicants position that claims 12, 5 and 15 cannot be anticipated by Pohl.

Claims 4 and 15 set forth the connecting means or connecting element as being formed of flat material, claim 15 setting forth flat sheet metal. The contact means is set forth as being a fork-type contact surrounding a portion of the flat material. This is quite different from any similar elements described in Pohl. Pohl does not teach or suggest using flat material and actually teaches away from flat material by describing pins and rods. Being able to

fabricate elements from flat material, particularly sheet metal, is not at all trivial. With the boon in the electronics industry, and notably the telecommunications industry, electrical connectors are being used in ever increasing numbers. While the cost of an individual connector might be relatively small, when one considers the great numbers required by the tremendous amount of electronic circuit boards in today's society, a small difference in price between two connectors can be very substantial. It is much easier to produce elements from flat sheet metal than it is to produce rods or pins. Sheet material can be made in large sheets and the individual components punched out. In this way individual components can be easily made in thousands at a time. The elements of Pohl on the other hand require much more labor and are not lent to mass production as easily as the present invention. By the present invention setting forth the use of flat material, the cost of manufacturing for the present invention is therefore much lower than Pohl. This then makes the electronic apparatus which uses the present invention to also be much cheaper and more affordable. It is only Applicant who teaches taking advantage of such economies of skill by using flat material. For this reason claims 4 and 15 further define over Pohl.

It is Applicants position that the plug connector portion or plug connector means in claims 4 and 15 also defines the present invention over the prior art. The Examiner has stated that the Examiner feels such a fork-type contact is "considered old and well known in the art and would have been an obvious of design". The

Examiner has not provided any support showing that a fork-type contact is well known and why a person skilled in the art would be led to consider such a fork-type contact in Pohl. Applicant respectfully requests that the Examiner provide references showing the desirability of combining a fork-type contact with Pohl or provide support for this statement in accordance with 37 CFR 1.107 (b).

The invention of Pohl is only meant to be used on edge surfaces of circuit boards. The elements 17 in Pohl each contact one side of a circuit board. The connectors in Pohl are therefore required to be mounted in the same plane as the circuit board. The present invention by using fork-type contacts extending out and perpendicular to the circuit board allows the present invention to be mounted anywhere on the circuit board and not only at the edges. This is a large improvement over Pohl in that many more connectors can be mounted on a circuit board when the contact means has a fork-type contact, instead of using the edge of the circuit board. This therefore also causes claims 4 and 15 to further define over Pohl.

The fork-type contacts being made out of flat material and the contact element being made out of flat materials allows a wide range of movement between the contact means and the connecting element which allows large forces to be absorbed without breaking the electrical connection.

Claims 11 and 15 set forth cutting/clamping members for receiving the wires and having edges for making electrical contact

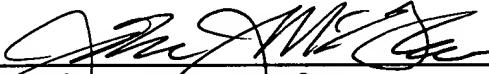
with the wire. These cutting/clamping members cut through the insulation of the wire and require that a large force be applied to the connecting element. This force is much greater than the connector of Pohl which does not have cutting/clamping contacts. It is clear that cutting/clamping contacts require the use of a much larger force and therefore the likelihood of damage to the electrical contact between the circuit board and the contact means is much greater. Pohl does not experience this large force and therefore is even further removed from the problems of the present invention and would be even less likely to suggest a solution.

Applicant wishes to point out to the Examiner that the field of electrical connections is a very crowded art. Small improvements in an electrical connector can make a big difference in the desirability of an electrical connector. With the use of such electrical connectors being so prevalent in today's society much research is being done in order to improve these connectors and improve their reliability. The flaws that are solved by this research and the solutions to these flaws may appear to be very minor when viewed on an individual basis. However, when hundreds of thousands of these connectors are produced and used in many different applications, the economies of scale and reliability become very important. Reliability is especially important because an entire electronic apparatus, such as a computer or a telecommunication system, could be rendered inoperative by the failure of one electrical connection.

At this time Applicant respectfully requests reconsideration of this application and based on the above amendments, and remarks believes that allowance of this application is warranted.

Respectfully submitted
for Applicant

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April 14, 1992



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